Free reading Theory of elastic waves in crystals (2023)

the primary objective of this book is to give the reader a basic understanding of waves and their propagation in a linear elastic continuum the studies of elastodynamic theory and its application to fundamental value problems should prepare the reader to tackle many physical problems of general interest in engineering and geophysics and of particular interest in mechanics and seismology elastic waves possess some remarkable properties and have become ever more important to applications in fields such as telecommunications signal processing medicine echography and metallurgy non destructive testing these volumes serve as a bridge between basic books on wave phenomena and more technically oriented books on specific applications of wave phenomena the first volume studies the different mechanisms of propagation in isotropic and anisotropic media the second volume describes the generation and applications of free and guided waves the translation into english of academician fedorov s ex cellent treatise on elastic wave propagation in solids has come at an opportune time his systematic exposition of all aspects of this field is most lucid and straightforward the author has gone to considerable pains to develop in his mathematical background a consistent tensor framework which acts as a unifying motif through out the various aspects of the subject in many respects his approach will appear quite novel as his treatment introduces several concepts and parameters previously unfamiliar to the literature of the west extensive tables in the final chapters illustrate the application of these ideas to the exist ing body of experimental data the book is both extensive and comprehensive in al1 phases of the subject workers in the fields of ultrasonic propagation and elastic properties will find this treatise of great interest and direct concern h b huntington rensselaer polytechnic institute troy new york november 1967 v preface to the american edition in preparing this edition i have corrected various misprints and errors appearing in the russian edition but i have also incorpo rated some substantial changes and additions the latter representing some results i and my colleagues have recently obtained and pub lished in russian journals for example in section 32 i have added a general derivation of the equation for the seetion of the wave surface by a symmetry plane for cubic hexagonal tetragonal and orthorhombic crystals elastic waves possess some remarkable properties and have become ever more important to applications in fields such as telecommunications signal processing medicine echography and metallurgy non destructive testing these volumes serve as a bridge between basic books on wave phenomena and more technically oriented books on specific applications of wave phenomena the first volume studies the different mechanisms of propagation in isotropic and anisotropic media the second volume describes the generation and applications of free and guided waves elastic waves in the earth provides information on the relationship between seismology and geophysics and their general aspects the book offers elastodynamic equations and derivative equations that can be used in the propagation of elastic waves it also covers major topics in detail such as the fundamentals of elastodynamics the lamb s problem which includes the cagniard de hoop theory rays and modes in a radially inhomogeneous earth and in multilayered media which includes the thomson haskell theory the elastic wave dissipation the seismic source and noise and the seismographs the book consists of 33 chapters the first 16 chapters include basic material related to the propagation of elastic waves topics covered by these chapters include scalars vectors and tensors in cartesian coordinates stress and strain analysis equations of elasticity and motion plane waves rayleigh waves plane wave theory and fluid fluid and solid solid interfaces the second half of the book covers various ray and mode theories elastic wave dissipation and the observations and theories of seismic source and seismic noise it concludes by discussing earthquake seismology and different seismographs like the pendulum seismometer and the strain seismometer elastic waves are used in fields as diverse as the non destructive evaluation of materials medicine seismology and telecommunications elastic waves in solids 1 presents the different modes of propagation of elastic waves in increasingly complex media and structures it first studies the propagation in an unlimited solid where only the material properties are taken into account it then analyzes reflection and transmission phenomena at an interface with a fluid or a second solid it explains the search for propagation modes on a free surface or at the interface between two media finally it proposes a

study of the dispersive propagation of elastic waves guided by a plate or a cylinder this book is intended for students completing a master s degree in acoustics mechanics geophysics or engineering as well as teachers and researchers in these disciplines john g harris intended to explain in this book the special techniques required to model the radiation and diffraction of elastic and surface waves sadly he died before he could fulfil this ambition but his plan has been brought to fruition by a team of his distinguished collaborators the book begins with the basic underlying equations for wave motion and then builds upon this foundation by solving a number of fundamental scattering problems the remaining chapters provide a thorough introduction to modern techniques that have proven essential to understanding radiation and diffraction at high frequencies graduate students researchers and professionals in applied mathematics physics and engineering will find that the chapters increase in complexity beginning with plane wave propagation and spectral analyses other topics include elastic wave theory the wiener hopf technique the effects of viscosity on acoustic diffraction and the phenomenon of channelling of wave energy along guided structures the main goal of the book is a coherent treatment of the theory of propagation in materials of nonlinearly elastic waves of displacements which corresponds to one modern line of development of the nonlinear theory of elastic waves the book is divided on five basic parts the necessary information on waves and materials the necessary information on nonlinear theory of elasticity and elastic materials analysis of one dimensional nonlinear elastic waves of displacement longitudinal vertically and horizontally polarized transverse plane nonlinear elastic waves of displacement analysis of one dimensional nonlinear elastic waves of displacement cylindrical and torsional nonlinear elastic waves of displacement analysis of two dimensional nonlinear elastic waves of displacement rayleigh and love nonlinear elastic surface waves the book is addressed first of all to people working in solid mechanics from the students at an advanced undergraduate and graduate level to the scientists professionally interesting in waves but mechanics is understood in the broad sense when it includes mechanical and other engineering material science applied mathematics and physics and so forth the genesis of this book can be found in author s years of research and teaching while a head of department at sp timoshenko institute of mechanics national academy of sciences of ukraine a member of center for micro and nanomechanics at engineering school of university of aberdeen scotland and a professor at physical mathematical faculty of national technical university of ukraine kpi the book comprises 11 chapters each chapter is complemented by exercises which can be used for the next development of the theory of nonlinear waves wave propagation in elastic solids focuses on linearized theory and perfectly elastic media this book discusses the one dimensional motion of an elastic continuum linearized theory of elasticity elastodynamic theory and elastic waves in an unbounded medium the plane harmonic waves in elastic half spaces harmonic waves in waveguides and forced motions of a half space are also elaborated this text likewise covers the transient waves in layers and rods diffraction of waves by a slit and thermal and viscoelastic effects and effects of anisotropy and nonlinearity other topics include the summary of equations in rectangular coordinates time harmonic plane waves approximate theories for rods and transient in plane motion of a layer this publication is a good source for students and researchers conducting work on the wave propagation in elastic solids ultrasonic non destructive evaluation nde plays an increasingly important role in determining properties and detecting defects in composite materials and the analysis of wave behavior is crucial to effectively using nde techniques the complexity of elastic wave propagation in anisotropic media has led to a reliance on numerical methods of analysis methods that are often quite time consuming and whose results yield even further difficulties in extracting explicit phenomena and characteristics innovative and insightful elastic waves in anisotropic laminates establishes a set of high performance analytical numerical methods for elastic wave analysis of anisotropic layered structures the treatment furnishes a comprehensive introduction sound theoretical development and applications to smart materials plates and shells the techniques detailed in both the time and frequency domains include methods that combine the finite element method fem with the fourier transform approach and the strip element method sem these methods can also be used for expediently finding the green s function for anisotropic laminates useful for inverse problems related to wave propagation and methods for inverse analyses including conjugate gradient methods and genetic algorithms are also introduced the text is complemented by many examples generated using software codes based on the techniques developed filled with

charts and illustrations elastic waves in anisotropic laminates is accessible even to readers from non engineering backgrounds and offers a unique opportunity to discover methods that can lead to an understanding of the dynamic characteristics and wave motion behaviors of advanced composite materials gives an up to date interdisciplinary account of important research findings covering theoretical and practical applications of elastic wave propagation discusses waves in a linear homogenous isotropic boundaries and modern problems in wave phenomena such as diffraction scattering reflection and dispersion as well as higher order effects uses analytical numerical and experimental methods this volume contains a timely collection of research papers on the latest developments in the ever increasing use of elastic waves in a variety of contexts there are reports on wave propagation in various types of media in both isotropic and anisotropic bodies in homogeneous and inhomogeneous media in media with cracks or inclusions in random media and in layered composites the bulk of the papers are concerned with propagation in elastic media but also included are viscoelastic thermoelastic and magneto electroelastic wave propagation as well as waves in porous and piezo electric bodies consideration is given to propagation in bodies as diverse as stretched elastic strings to surfaces such as thin walled cylinders and thin films under stress applications considered include the determination of the depth of cracks analysis of ground motions generated by a finite fault in seismology surface wave spreading on piezo electric solids and dynamical stress intensity factors most of the papers are theoretical in nature and many are complemented by numerical studies also included are a general survey on experimental techniques and reports on experimental work the volume will be of interest to those who do theoretical studies of elastic wave propagation and to those who apply elastic waves whether in seismology non destructive testing the fabrication of devices or underwater acoustics etc this volume outlines the basic concepts and methods of the theory of wave propagation in elastic materials the linear theory of elasticity is covered culminating in the displacement equations of motion one dimensional waves are analyzed through the d alembert solution dr hudson s advanced textbook presents the theory of small disturbances propagating through solids this volume contains 16 classic essays from the 17th to the 21st centuries on aspects of elastic wave theory elastic waves high frequency theory is concerned with mathematical aspects of the theory of high frequency elastic waves which is based on the ray method the foundations of elastodynamics are presented along with the basic theory of plane and spherical waves the ray method is then described in considerable detail for bulk waves in isotropic and anisotropic media and also for the rayleigh waves on the surface of inhomogeneous anisotropic elastic solids much attention is paid to analysis of higher order terms and to generation of waves in inhomogeneous media the aim of the book is to present a clear systematic description of the ray method and at the same time to emphasize its mathematical beauty luckily this beauty is usually not accompanied by complexity and mathematical ornateness an advanced level textbook on wave propagation and scattering directed at applied mathematicians seismologists and engineers elastic waves are used in fields as diverse as the non destructive evaluation of materials medicine seismology and telecommunications elastic waves in solids 2 analyzes the radiation scattering and generation of these waves it studies the emission of bulk or surface waves from sources localized on the surface of an isotropic or anisotropic solid it then examines the scattering of a longitudinal or transverse elastic wave by one or more cylindrical or spherical heterogeneities finally it explores the methods and devices used to generate and detect elastic waves using the piezoelectric effect or the interaction with a laser beam accompanying figures illustrate these properties and the text provides the orders of magnitude of some characteristic parameters this book is intended for students completing a master s degree in acoustics mechanics geophysics or engineering as well as teachers and researchers in these disciplines understanding and analysing the complex phenomena related to elastic wave propagation has been the subject of intense research for many years and has enabled application in numerous fields of technology including structural health monitoring shm in the course of the rapid advancement of diagnostic methods utilising elastic wave propagation it has become clear that existing methods of elastic wave modeling and analysis are not always very useful developing numerical methods aimed at modeling and analysing these phenomena has become a necessity furthermore any methods developed need to be verified experimentally which has become achievable with the advancement of measurement methods utilising laser vibrometry guided waves in structures for shm reports on the simulation

analysis and experimental investigation related propagation of elastic waves in isotropic or laminated structures the full spectrum of theoretical and practical issues associated with propagation of elastic waves is presented and discussed in this one study key features covers both numerical and experimental aspects of modeling analysis and measurement of elastic wave propagation in structural elements formed from isotropic or composite materials comprehensively discusses the application of the spectral finite element method for modelling and analysing elastic wave propagation in diverse structural elements presents results of experimental measurements employing advanced laser technologies validating the quality and correctness of the developed numerical models accompanying website wiley com go ostachowicz contains demonstration versions of commercial software developed by the authors for modelling and analyzing elastic wave propagation using the spectral finite element method guided waves in structures for shm provides a state of the art resource for researchers and graduate students in structural health monitoring signal processing and structural dynamics this book should also provide a useful reference for practising engineers within structural health monitoring and non destructive testing developments in solid earth geophysics 10 transient waves in visco elastic media deals with the propagation of transient elastic disturbances in visco elastic media more specifically it explores the visco elastic behavior of a medium whether gaseous liquid or solid for very small amplitude disturbances this volume provides a historical overview of the theory of the propagation of elastic waves in solid bodies along with seismic prospecting and the nature of seismograms it also discusses the seismic experiments the behavior of waves propagated in accordance with the stokes wave equation and wavelet functions and their polynomials the book explains the laws of propagation of seismic wavelets and seismic ray paths as well as the equations of wavelet propagation the velocity type seismic wavelet and the spectrum of the wavelet it discusses the motion of a mechanical seismograph disturbed by extraneous forces or motions it also provides information on the differential equation describing the motion of a galvanometer laboratory studies of wavelet contraction and characteristics of a wavelet contractor amplifier furthermore the book explains the experimental studies of the primary seismic disturbance and internal friction this monograph is a valuable source of information for physicists students who want to pursue a career in geophysics or selenophysics and those who actively working in these fields this paperback edition of dr hudson s advanced textbook presents the theory of small disturbances propagating through solids the material is set out carefully in mathematical detail the linearised theory of elasticity has now been replaced by a more fundamental approach based on a generalised theory of continuum mechanics despite this change of emphasis in solid mechanics there remain important areas of physics in which the linear theory is clearly of fundamental importance especially in seismology noise analysis and the non destructive testing of materials this is a textbook suitable for advanced undergraduates in a variety of disciplines including applied mathematics applied physics geophysics and structural and civil engineering the book is of particular interest to seismologists and physicists engaged in non destructive testing this book presents the main results of extensive research on diffraction radiation and propagation of elastic waves in recent years there has been an increase in interest in problems in the fields of diffraction radiation and propagation of elastic waves associated with the interaction of bodies both with each other and with media interfaces in addition there is currently extensive focus on the solution of three dimensional wave problems with the help of debye potentials for elastic isotropic and anisotropic bodies of analytical and non analytical forms this book addresses the modelling of mechanical waves by asking the right questions about them and trying to find suitable answers the questions follow the analytical sequence from elementary understandings to complicated cases following a step by step path towards increased knowledge the focus is on waves in elastic solids although some examples also concern non conservative cases for the sake of completeness special attention is paid to the understanding of the influence of microstructure nonlinearity and internal variables in continua with the help of many mathematical models for describing waves physical phenomena concerning wave dispersion nonlinear effects emergence of solitary waves scales and hierarchies of waves as well as the governing physical parameters are analysed also the energy balance in waves and non conservative models with energy influx are discussed finally all answers are interwoven into the canvas of complexity the most readable survey of the theoretical core of current knowledge available the author gives a concise account of the classical theory necessary to an

understanding of the subject and considers how this theory has been extended to solids 1 the fundamental hypothesis of microstructured elastic solids structural phenomenological model 1 1 mathematical models of solids with microstructure 1 2 definition of material constants 2 gradient elasticity media dispersion dissipation non linearity 2 1 dynamic equations energy and momentum variation law 2 2 dispersion properties of longitudinal and shear waves surface rayleigh waves 2 3 dissipative properties 2 4 nonlinear plain stationary waves 2 5 quasi plain wave beams 2 6 self modulation of quasi harmonic shear waves 2 7 resonant interaction of quasi harmonic waves 2 8 noise waves 3 gradient elasticity media damaged medium magnetoelasticity 3 1 waves in damaged medium with microstructure 3 2 magneto elastic waves in the medium with microstructure 4 cosserat continuum 4 1 basic equations of micropolar elasticity theory 4 2 dispersion properties of volume waves 4 3 wave reflection from the free interface of micropolar halfspace rayleigh surface waves 4 4 normal waves in a micropolar layer 4 5 nonlinear resonant interaction of longitudinal and rotation waves 4 6 waves in cosserat pseudocontinuum 4 7 waves in the cosserat continuum with symmetric stress tensor 5 waves in two component mixture of solids 5 1 dispersion properties 5 2 some nonlinear wave effects 6 waves in micromorphic solids 6 1 dynamics equations 6 2 different types of volume waves and their dispersion properties 6 3 surface shear waves in the gradient elastic half space with surface energy 7 elasto plastic waves in the medium with dislocations 7 1 equations of dynamics 7 2 dispersion properties 7 3 some nonlinear problems 7 4 correlation of elasto plastic continuum and cosserat continuum 7 5 example of research of the influence of dislocations on dispersion and damping of ultrasound in solid body 8 wave problems of micropolar hydrodynamics 8 1 rotational waves in micropolar liquids 8 2 shear surface wave at the interface of elastic body and micropolar liquid 8 3 shear surface wave at the interface between elastic half space and conducting viscous liquid in a magnetic field this work has been selected by scholars as being culturally important and is part of the knowledge base of civilization as we know it this work is in the public domain in the united states of america and possibly other nations within the united states you may freely copy and distribute this work as no entity individual or corporate has a copyright on the body of the work scholars believe and we concur that this work is important enough to be preserved reproduced and made generally available to the public to ensure a quality reading experience this work has been proofread and republished using a format that seamlessly blends the original graphical elements with text in an easy to read typeface we appreciate your support of the preservation process and thank you for being an important part of keeping this knowledge alive and relevant in this monograph i record those parts of the theory of transverse isotropic elastic wave propagation which lend themselves to an exact treatment within the framework of linear theory emphasis is placed on transient wave motion problems in two and three dimensional unbounded and semibounded solids for which explicit results can be obtained without resort to approximate methods of integration the mathematical techniques used many of which appear here in book form for the first time will be of interest to applied mathematicians engeneers and scientists whose specialty includes crystal acoustics crystal optics magnetogasdynamics dislocation theory seismology and fibre wound composites my interest in the subject of anisotropic wave motion had its origin in the study of small deformations superposed on large deformations of elastic solids by varying the initial stretch in a homogeneously deformed solid it is possible to synthesize aniso tropic materials whose elastic parameters vary continuously the range of the parameter variation is limited by stability considerations in the case of small deformations super posed on large deformation problems and what is essentially the same thing by the of hyperbolicity solids whose parameters allow wave motion for anisotropic notion solids the full implication of hyperbolicity for anisotropic elastic solids has never been previously examined and even now the constraints which it imposes on the elasticity constants have only been examined for the class of transversely isotropic hexagonal crystals materials

The Theory of Elastic Waves and Waveguides *2012-12-02*

the primary objective of this book is to give the reader a basic understanding of waves and their propagation in a linear elastic continuum the studies of elastodynamic theory and its application to fundamental value problems should prepare the reader to tackle many physical problems of general interest in engineering and geophysics and of particular interest in mechanics and seismology

Elastic Waves in Solids I *1999-11-29*

elastic waves possess some remarkable properties and have become ever more important to applications in fields such as telecommunications signal processing medicine echography and metallurgy non destructive testing these volumes serve as a bridge between basic books on wave phenomena and more technically oriented books on specific applications of wave phenomena the first volume studies the different mechanisms of propagation in isotropic and anisotropic media the second volume describes the generation and applications of free and guided waves

Theory of Elastic Waves in Crystals *2013-04-17*

the translation into english of academician fedorov s ex cellent treatise on elastic wave propagation in solids has come at an opportune time his systematic exposition of all aspects of this field is most lucid and straightforward the author has gone to considerable pains to develop in his mathematical background a consistent tensor framework which acts as a unifying motif through out the various aspects of the subject in many respects his approach will appear quite novel as his treatment introduces several concepts and parameters previously unfamiliar to the literature of the west extensive tables in the final chapters illustrate the application of these ideas to the exist ing body of experimental data the book is both extensive and comprehensive in al1 phases of the subject workers in the fields of ultrasonic propagation and elastic properties will find this treatise of great interest and direct concern h b huntington rensselaer polytechnic institute troy new york november 1967 v preface to the american edition in preparing this edition i have corrected various misprints and errors appearing in the russian edition but i have also incorpo rated some substantial changes and additions the latter representing some results i and my colleagues have recently obtained and pub lished in russian journals for example in section 32 i have added a general derivation of the equation for the seetion of the wave surface by a symmetry plane for cubic hexagonal tetragonal and orthorhombic crystals

Elastic Waves in Solids II 1999-11-30

elastic waves possess some remarkable properties and have become ever more important to applications in fields such as telecommunications signal processing medicine echography and metallurgy non destructive testing these volumes serve as a bridge between basic books on wave phenomena and more technically oriented books on specific applications of wave phenomena the first volume studies the different mechanisms of propagation in isotropic and anisotropic media the second volume describes the generation and applications of free and guided waves

Elastic Waves in the Earth *2012-12-02*

elastic waves in the earth provides information on the relationship between seismology and geophysics and their general aspects the book offers elastodynamic equations and derivative equations that can be used in the propagation of elastic waves it also covers major topics in detail such as the fundamentals of elastodynamics the lamb s problem which includes the cagniard de hoop theory rays and modes in a radially inhomogeneous earth and in multilayered media which includes the thomson haskell theory the elastic wave dissipation the seismic source and noise and the seismographs the book consists of 33 chapters the first 16 chapters include basic material related to the propagation of elastic waves topics covered by these chapters include scalars vectors and tensors in cartesian coordinates stress and strain analysis equations of elasticity and motion plane waves rayleigh waves plane wave theory and fluid fluid and solid solid interfaces the second half of the book covers various ray and mode theories elastic wave dissipation and the observations and theories of seismic source and seismic noise it concludes by discussing earthquake seismology and different seismographs like the pendulum seismometer and the strain seismometer

Elastic Waves in Solids, Volume 1 2022-04-19

elastic waves are used in fields as diverse as the non destructive evaluation of materials medicine seismology and telecommunications elastic waves in solids 1 presents the different modes of propagation of elastic waves in increasingly complex media and structures it first studies the propagation in an unlimited solid where only the material properties are taken into account it then analyzes reflection and transmission phenomena at an interface with a fluid or a second solid it explains the search for propagation modes on a free surface or at the interface between two media finally it proposes a study of the dispersive propagation of elastic waves guided by a plate or a cylinder this book is intended for students completing a master s degree in acoustics mechanics geophysics or engineering as well as teachers and researchers in these disciplines

Elastic Waves in Solids *1980*

john g harris intended to explain in this book the special techniques required to model the radiation and diffraction of elastic and surface waves sadly he died before he could fulfil this ambition but his plan has been brought to fruition by a team of his distinguished collaborators the book begins with the basic underlying equations for wave motion and then builds upon this foundation by solving a number of fundamental scattering problems the remaining chapters provide a thorough introduction to modern techniques that have proven essential to understanding radiation and diffraction at high frequencies graduate students researchers and professionals in applied mathematics physics and engineering will find that the chapters increase in complexity beginning with plane wave propagation and spectral analyses other topics include elastic wave theory the wiener hopf technique the effects of viscosity on acoustic diffraction and the phenomenon of channelling of wave energy along guided structures

Elastic Waves at High Frequencies *2010-07-22*

the main goal of the book is a coherent treatment of the theory of propagation in materials of nonlinearly elastic waves of displacements which corresponds to one modern line of development of the nonlinear theory of elastic waves the book is divided on five basic parts the

necessary information on waves and materials the necessary information on nonlinear theory of elasticity and elastic materials analysis of one dimensional nonlinear elastic waves of displacement longitudinal vertically and horizontally polarized transverse plane nonlinear elastic waves of displacement analysis of one dimensional nonlinear elastic waves of displacement cylindrical and torsional nonlinear elastic waves of displacement analysis of two dimensional nonlinear elastic waves of displacement rayleigh and love nonlinear elastic surface waves the book is addressed first of all to people working in solid mechanics from the students at an advanced undergraduate and graduate level to the scientists professionally interesting in waves but mechanics is understood in the broad sense when it includes mechanical and other engineering material science applied mathematics and physics and so forth the genesis of this book can be found in author s years of research and teaching while a head of department at sp timoshenko institute of mechanics national academy of sciences of ukraine a member of center for micro and nanomechanics at engineering school of university of aberdeen scotland and a professor at physical mathematical faculty of national technical university of ukraine kpi the book comprises 11 chapters each chapter is complemented by exercises which can be used for the next development of the theory of nonlinear waves

The Theory of Elastic Waves and Waveguides *1984-01-01*

wave propagation in elastic solids focuses on linearized theory and perfectly elastic media this book discusses the one dimensional motion of an elastic continuum linearized theory of elasticity elastodynamic theory and elastic waves in an unbounded medium the plane harmonic waves in elastic half spaces harmonic waves in waveguides and forced motions of a half space are also elaborated this text likewise covers the transient waves in layers and rods diffraction of waves by a slit and thermal and viscoelastic effects and effects of anisotropy and nonlinearity other topics include the summary of equations in rectangular coordinates time harmonic plane waves approximate theories for rods and transient in plane motion of a layer this publication is a good source for students and researchers conducting work on the wave propagation in elastic solids

Nonlinear Elastic Waves in Materials *2014-04-23*

ultrasonic non destructive evaluation nde plays an increasingly important role in determining properties and detecting defects in composite materials and the analysis of wave behavior is crucial to effectively using nde techniques the complexity of elastic wave propagation in anisotropic media has led to a reliance on numerical methods of analysis methods that are often quite time consuming and whose results yield even further difficulties in extracting explicit phenomena and characteristics innovative and insightful elastic waves in anisotropic laminates establishes a set of high performance analytical numerical methods for elastic wave analysis of anisotropic layered structures the treatment furnishes a comprehensive introduction sound theoretical development and applications to smart materials plates and shells the techniques detailed in both the time and frequency domains include methods that combine the finite element method fem with the fourier transform approach and the strip element method sem these methods can also be used for expediently finding the green s function for anisotropic laminates useful for inverse problems related to wave propagation and methods for inverse analyses including conjugate gradient methods and genetic algorithms are also introduced the text is complemented by many examples generated using software codes based on the techniques developed filled with charts and illustrations elastic waves in anisotropic laminates is accessible even to readers from non engineering backgrounds and offers a unique opportunity to discover methods that can lead to an understanding of the dynamic characteristics and wave motion behaviors of advanced composite materials

Wave Propagation in Elastic Solids 2016-01-21

gives an up to date interdisciplinary account of important research findings covering theoretical and practical applications of elastic wave propagation discusses waves in a linear homogenous isotropic boundaries and modern problems in wave phenomena such as diffraction scattering reflection and dispersion as well as higher order effects uses analytical numerical and experimental methods

Theory of Elastic Waves *2022-12*

this volume contains a timely collection of research papers on the latest developments in the ever increasing use of elastic waves in a variety of contexts there are reports on wave propagation in various types of media in both isotropic and anisotropic bodies in homogeneous and inhomogeneous media in media with cracks or inclusions in random media and in layered composites the bulk of the papers are concerned with propagation in elastic media but also included are viscoelastic thermoelastic and magneto electroelastic wave propagation as well as waves in porous and piezo electric bodies consideration is given to propagation in bodies as diverse as stretched elastic strings to surfaces such as thin walled cylinders and thin films under stress applications considered include the determination of the depth of cracks analysis of ground motions generated by a finite fault in seismology surface wave spreading on piezo electric solids and dynamical stress intensity factors most of the papers are theoretical in nature and many are complemented by numerical studies also included are a general survey on experimental techniques and reports on experimental work the volume will be of interest to those who do theoretical studies of elastic wave propagation and to those who apply elastic waves whether in seismology non destructive testing the fabrication of devices or underwater acoustics etc

Elastic Waves in Anisotropic Laminates 2001-11-13

this volume outlines the basic concepts and methods of the theory of wave propagation in elastic materials the linear theory of elasticity is covered culminating in the displacement equations of motion one dimensional waves are analyzed through the d alembert solution

Diffraction of Elastic Waves and Dynamic Stress Concentrations 1973

dr hudson s advanced textbook presents the theory of small disturbances propagating through solids

Modern Problems in Elastic Wave Propagation *1978-10-27*

this volume contains 16 classic essays from the 17th to the 21st centuries on aspects of elastic wave theory

Elastic Wave Propagation 2013-10-22

elastic waves high frequency theory is concerned with mathematical aspects of the theory of high frequency elastic waves which is based on the ray method the foundations of elastodynamics are presented along with the basic theory of plane and spherical waves the ray

method is then described in considerable detail for bulk waves in isotropic and anisotropic media and also for the rayleigh waves on the surface of inhomogeneous anisotropic elastic solids much attention is paid to analysis of higher order terms and to generation of waves in inhomogeneous media the aim of the book is to present a clear systematic description of the ray method and at the same time to emphasize its mathematical beauty luckily this beauty is usually not accompanied by complexity and mathematical ornateness

Introduction to Elastic Wave Propagation 1994-09-06

an advanced level textbook on wave propagation and scattering directed at applied mathematicians seismologists and engineers

The Excitation and Propagation of Elastic Waves 1984-09-27

elastic waves are used in fields as diverse as the non destructive evaluation of materials medicine seismology and telecommunications elastic waves in solids 2 analyzes the radiation scattering and generation of these waves it studies the emission of bulk or surface waves from sources localized on the surface of an isotropic or anisotropic solid it then examines the scattering of a longitudinal or transverse elastic wave by one or more cylindrical or spherical heterogeneities finally it explores the methods and devices used to generate and detect elastic waves using the piezoelectric effect or the interaction with a laser beam accompanying figures illustrate these properties and the text provides the orders of magnitude of some characteristic parameters this book is intended for students completing a master s degree in acoustics mechanics geophysics or engineering as well as teachers and researchers in these disciplines

Classics of Elastic Wave Theory 2007

understanding and analysing the complex phenomena related to elastic wave propagation has been the subject of intense research for many years and has enabled application in numerous fields of technology including structural health monitoring shm in the course of the rapid advancement of diagnostic methods utilising elastic wave propagation it has become clear that existing methods of elastic wave modeling and analysis are not always very useful developing numerical methods aimed at modeling and analysing these phenomena has become a necessity furthermore any methods developed need to be verified experimentally which has become achievable with the advancement of measurement methods utilising laser vibrometry guided waves in structures for shm reports on the simulation analysis and experimental investigation related propagation of elastic waves in isotropic or laminated structures the full spectrum of theoretical and practical issues associated with propagation of elastic waves is presented and discussed in this one study key features covers both numerical and experimental aspects of modeling analysis and measurement of elastic wave propagation in structural elements formed from isotropic or composite materials comprehensively discusses the application of the spectral finite element method for modelling and analysing elastic wave propagation in diverse structural elements presents results of experimental measurements employing advanced laser technologies validating the quality and correctness of the developed numerical models accompanying website wiley com go ostachowicz contains demonstration versions of commercial software developed by the authors for modelling and analyzing elastic wave propagation using the spectral finite element method guided waves in structures for shm provides a state of the art resource for researchers and graduate students in structural health monitoring signal processing and structural dynamics this book should also provide a useful reference for practising engineers within structural health monitoring and non destructive testing

Elastic Waves *2018-04-09*

developments in solid earth geophysics 10 transient waves in visco elastic media deals with the propagation of transient elastic disturbances in visco elastic media more specifically it explores the visco elastic behavior of a medium whether gaseous liquid or solid for very small amplitude disturbances this volume provides a historical overview of the theory of the propagation of elastic waves in solid bodies along with seismic prospecting and the nature of seismograms it also discusses the seismic experiments the behavior of waves propagated in accordance with the stokes wave equation and wavelet functions and their polynomials the book explains the laws of propagation of seismic wavelets and seismic ray paths as well as the equations of wavelet propagation the velocity type seismic wavelet and the spectrum of the wavelet it discusses the motion of a mechanical seismograph disturbed by extraneous forces or motions it also provides information on the differential equation describing the motion of a galvanometer laboratory studies of wavelet contraction and characteristics of a wavelet contractor amplifier furthermore the book explains the experimental studies of the primary seismic disturbance and internal friction this monograph is a valuable source of information for physicists students who want to pursue a career in geophysics or selenophysics and those who actively working in these fields

Linear Elastic Waves *2001-08-06*

this paperback edition of dr hudson s advanced textbook presents the theory of small disturbances propagating through solids the material is set out carefully in mathematical detail the linearised theory of elasticity has now been replaced by a more fundamental approach based on a generalised theory of continuum mechanics despite this change of emphasis in solid mechanics there remain important areas of physics in which the linear theory is clearly of fundamental importance especially in seismology noise analysis and the non destructive testing of materials this is a textbook suitable for advanced undergraduates in a variety of disciplines including applied mathematics applied physics geophysics and structural and civil engineering the book is of particular interest to seismologists and physicists engaged in non destructive testing

Diffraction of Elastic Waves and Dynamic Stress Concentrations *1969*

this book presents the main results of extensive research on diffraction radiation and propagation of elastic waves in recent years there has been an increase in interest in problems in the fields of diffraction radiation and propagation of elastic waves associated with the interaction of bodies both with each other and with media interfaces in addition there is currently extensive focus on the solution of three dimensional wave problems with the help of debye potentials for elastic isotropic and anisotropic bodies of analytical and non analytical forms

Elastic Waves in Solids, Volume 2 *2022-07-20*

this book addresses the modelling of mechanical waves by asking the right questions about them and trying to find suitable answers the questions follow the analytical sequence from elementary understandings to complicated cases following a step by step path towards increased knowledge the focus is on waves in elastic solids although some examples also concern non conservative cases for the sake of completeness special attention is paid to the understanding of the influence of microstructure nonlinearity and internal variables in

continua with the help of many mathematical models for describing waves physical phenomena concerning wave dispersion nonlinear effects emergence of solitary waves scales and hierarchies of waves as well as the governing physical parameters are analysed also the energy balance in waves and non conservative models with energy influx are discussed finally all answers are interwoven into the canvas of complexity

Guided Waves in Structures for SHM *2011-12-30*

the most readable survey of the theoretical core of current knowledge available the author gives a concise account of the classical theory necessary to an understanding of the subject and considers how this theory has been extended to solids

The Microstructure and Macrostructure of Elastic Waves in One-dimensional Continuous Nonhomogeneous Media 1960

1 the fundamental hypothesis of microstructured elastic solids structural phenomenological model 1 1 mathematical models of solids with microstructure 1 2 definition of material constants 2 gradient elasticity media dispersion dissipation non linearity 2 1 dynamic equations energy and momentum variation law 2 2 dispersion properties of longitudinal and shear waves surface rayleigh waves 2 3 dissipative properties 2 4 nonlinear plain stationary waves 2 5 quasi plain wave beams 2 6 self modulation of quasi harmonic shear waves 2 7 resonant interaction of quasi harmonic waves 2 8 noise waves 3 gradient elasticity media damaged medium magnetoelasticity 3 1 waves in damaged medium with microstructure 3 2 magneto elastic waves in the medium with microstructure 4 cosserat continuum 4 1 basic equations of micropolar elasticity theory 4 2 dispersion properties of volume waves 4 3 wave reflection from the free interface of micropolar halfspace rayleigh surface waves 4 4 normal waves in a micropolar layer 4 5 nonlinear resonant interaction of longitudinal and rotation waves 4 6 waves in cosserat pseudocontinuum 4 7 waves in the cosserat continuum with symmetric stress tensor 5 waves in two component mixture of solids 5 1 dispersion properties 5 2 some nonlinear wave effects 6 waves in micromorphic solids 6 1 dynamics equations 6 2 different types of volume waves and their dispersion properties 6 3 surface shear waves in the gradient elastic half space with surface energy 7 elasto plastic waves in the medium with dislocations 7 1 equations of dynamics 7 2 dispersion properties 7 3 some nonlinear problems 7 4 correlation of elasto plastic continuum and cosserat continuum 7 5 example of research of the influence of dislocations on dispersion and damping of ultrasound in solid body 8 wave problems of micropolar hydrodynamics 8 1 rotational waves in micropolar liquids 8 2 shear surface wave at the interface of elastic body and micropolar liquid 8 3 shear surface wave at the interface between elastic half space and conducting viscous liquid in a magnetic field

Elastic Waves in Layered Media *1969*

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Transient Waves in Visco-Elastic Media 2012-12-02

in this monograph i record those parts of the theory of transverse isotropic elastic wave propagation which lend themselves to an exact treatment within the framework of linear theory emphasis is placed on transient wave motion problems in two and three dimensional unbounded and semibounded solids for which explicit results can be obtained without resort to approximate methods of integration the mathematical techniques used many of which appear here in book form for the first time will be of interest to applied mathematicians engeneers and scientists whose specialty includes crystal acoustics crystal optics magnetogasdynamics dislocation theory seismology and fibre wound composites my interest in the subject of anisotropic wave motion had its origin in the study of small deformations superposed on large deformations of elastic solids by varying the initial stretch in a homogeneously deformed solid it is possible to synthesize aniso tropic materials whose elastic parameters vary continuously the range of the parameter variation is limited by stability considerations in the case of small deformations super posed on large deformation problems and what is essentially the same thing by the of hyperbolicity solids whose parameters allow wave motion for anisotropic notion solids the full implication of hyperbolicity for anisotropic elastic solids has never been previously examined and even now the constraints which it imposes on the elasticity constants have only been examined for the class of transversely isotropic hexagonal crystals materials

The Excitation and Propagation of Elastic Waves *1980-05-29*

Diffraction, Radiation and Propagation of Elastic Waves in Isotropic and Anisotropic Bodies *2019-10-10*

Elastic Waves in Layered Media *1957*

The Analysis of Elastic Wave Propagation *1951*

Questions About Elastic Waves *2015*

Effects of Couple-stress on the Reflection and Scattering of Elastic Waves *1965*

Stress Waves in Solids *1963-01-01*

Scattering of Elastic Waves by a Rigid Spheroidal Inclusion and Dynamic Stress Concentration 1968

Crystal Acoustics 1970

Dispersion of Elastic Waves in a Hollow Circular Cylinder *1983*

Wave Processes in Solids with Microstructure *2003*

Propagation of Elastic Waves in a Floating Ice Sheet *2021-09-09*

Elastic wave propagation in transversely isotropic media *2012-12-06*

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